



Household financial contribution to the health System in Shiraz, Iran in 2012

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Abstract

Background: One common challenge to social systems is achieving equity in financial contributions and preventing financial loss. Because of the large and unpredictable nature of some costs, achieving this goal in the health system presents important and unique problems. The present study investigated the Household Financial Contributions (HFCs) to the health system.

Methods: The study investigated 800 households in Shiraz. The study sample size was selected using stratified sampling and cluster sampling in the urban and rural regions, respectively. The data was collected using the household section of the World Health Survey (WHS) questionnaire. Catastrophic health expenditures were calculated based on the ability of the household to pay and the reasons for the catastrophic health expenditures by a household were specified using logistic regression.

Results: The results showed that the fairness financial contribution index was 0.6 and that 14.2% of households were faced with catastrophic health expenditures. Logistic regression analysis revealed that household economic status, the basic and supplementary insurance status of the head of the household, existence of individuals in the household who require chronic medical care, use of dental and hospital care, rural location of residences, frequency of use of outpatient services, and Out-of-Pocket (OOP) payment for physician visits were effective factors for determining the likelihood of experiencing catastrophic health expenditure.

Conclusion: It appears that the current method of health financing in Iran does not adequately protect households against catastrophic health expenditure. Consequently, it is essential to reform healthcare financing.

Keywords: Household Financial Contribution (HFC), Health System, Catastrophic Health Expenditure, Fair Financial Contribution Index (FFCI)

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Key Messages

Implications for policy makers

- The high proportion of households facing catastrophic health expenditures suggests that the Iranian health system is moving slowly toward the goal of protecting all citizens against the catastrophic costs of illness.
- The main way to prevent catastrophic health expenditures is the adoption of prepayment mechanisms. The insignificant effect of insurance status in this study shows the need to revise the mechanisms used in Iran.
- Dental services are necessary and should be considered in benefit packages, because households that used these services were more likely to face catastrophic expenditure.
- Social assistance plans can increase household capacity to meet costs, thereby decreasing the likelihood of a household facing catastrophic health expenditures.

Implications for public

Households should know that illness gives no warning, so participating in a basic insurance scheme can help protect a family against financial hardship. Having supplementary insurance can significantly increase protection. Since inpatient services can be a source of catastrophic health expenditure, households should try to use preventive and outpatient services before their condition requires expensive advanced care.

Introduction

The increasing cost of healthcare worldwide and the challenge of achieving equity in financial contribution to health systems have raised special concerns in communities about how to finance the health system. Communities should ensure that residents are not deprived of access to health services because of the inability to pay. Providing such access

for all the citizens is the cornerstone of modern healthcare financing in many countries. Most discussions about health sector reform focus on an equity-based financing system (1). Depending on their culture, history, and objectives, different countries use different methods to finance their health systems, including tax-based insurance, social insurance, private insurance, and Out-of-Pocket (OOP) payment (2).

The fairness of these financing methods is determined based on household contributions to funding health expenditures (3). This contribution is calculated based on the ratio of household payments for healthcare services to their capacity to pay, which has been termed Household Financial Contribution (HFC) by the World Health Organization (WHO). HFC specifies the financial burden imposed on a household for payments to the health system (4).

High HFCs have short-term and long-term effects on living standards such that households may forgo the consumption of other goods and services in the short-term or be forced to sell their property, spend savings, and/or accumulate debt in the long-term (5). The Fair Financial Contribution Index (FFCI) and catastrophic healthcare expenditures were the indicators used by WHO to calculate equity in household payments to the health system (4).

WHO (6) reported that, globally, nearly 44 million households and more than 150 million individuals face catastrophic healthcare expenditures each year. Studies have shown that households facing catastrophic health expenditures had specific characteristics. Household economic status was confirmed to be one of the most important determinants (7). The implementation of health insurance plans in Mexico, China, and Thailand decreased the likelihood of catastrophic spending (8).

Several studies have shown that households with health insurance coverage were not necessarily protected from catastrophic expenditures (9). The use of health services and the frequency and type of usage are other determinants of catastrophic health expenditures (10). Households with disabled members, members with chronic medical conditions (7,11,12), or members over age 65 (12,13) have increased probability of catastrophe expenditures. Other characteristics of households, such as size, gender of household head, and ages of household members are also known to be effective factors (13–15).

In Iran, statistics for FFCI range from 83.7% in a national study to 56.0% in a regional study. For catastrophic healthcare expenditures, they range from 2.1 in a national study to 22.2 in a regional study (16,17). These differing statistics show the need for further investigation of indicators in the country. The present study calculated the FFCI, identified the number of households facing catastrophic healthcare expenditures, and specified the factors affecting a household faced with catastrophic healthcare expenditures in the city of Shiraz in 2012.

Shiraz is the sixth most populous city of Iran and is the capital of Fars province. The city population was 1,517,653 in 2011. This includes several rural areas that fall into the jurisdiction of two health centers, Shahid-e Enqelab and Shahid-e Valfajr. Each center has several rural health centers that operate wellness centers in their regions. The wellness centers provide basic health and health education services for suburban households.

In 2011 in Shiraz, there were nine municipality districts and 387,403 households in the city itself. Statistics from the Shahid-e Enqelab and Shahid-e Valfajr centers from 2011 show that there were 53,757 households living in suburban Shiraz.

Methods

A survey of HFCs to the health system in Shiraz was carried out by the Shiraz University of Medical Sciences in 2012. The study population comprised all households living in Shiraz. The study population for the present study was 441,160 households. The sample size of the present study was calculated using the following formula in which $p=10\%$ (Proportion of the households face with CHE) (18), $d=3\%$ (Minimal detectable difference), and $\alpha=0.05$ (Type I error). According to the formula in Equation 1, a sample size of 385 households was determined for this study (18), but this figure was doubled to allow for use of cluster sampling. The possible loss was considered to be 30 samples.

$$n = \frac{z_1^2 - \alpha / 2^{p(1-p)}}{d^2} \quad (1)$$

The sample size totaled 800 households. By sampling with probability proportional to size, sample sizes of 703 and 97 households were selected for Shiraz and its suburbs, respectively. Two sampling methods were used for the city and its suburbs.

Shiraz is divided into nine districts, each of which was considered to be a stratum. Sampling with probability proportional to size was done in each stratum to determine its sample size. Having determined the city sample size, the sample size of each stratum was randomly selected using customer water meter ID numbers from the Shiraz Water and Sewage Company. The questionnaires were completed by interviewing the heads or informed individuals of the households selected. If a researcher was unsuccessful after three tries in interviewing a household at a specific address, the next address was chosen as a replacement.

The data from Shahid-e Enqelab and Shahid-e Valfajr health centers was used to determine the sample size for the suburbs. There were, respectively, 13 and 12 rural health centers under their supervision. Each center was considered to be a cluster. Eight of the rural health centers were selected using systematic sampling. Since the number of households covered by each rural health center was different, sampling with probability proportional to size was used to determine the sample size of the eight health centers. The selected sample size was equally divided among the wellness centers and the required data was gathered by interview of heads or informed individuals of the selected households. Researchers contacted the wellness centers to inform them of the number of households in their area that would take part in the interviews.

Study tools

Data was gathered using the household section of the questionnaire entitled World Health Survey (WHS) which was developed by WHO in 2003 to evaluate the performance of health systems (4). This section was translated into Persian and its validity and reliability were verified by Kavosi *et al.* (19).

Statistical analysis

The most important indicators of equity in health, i.e. the proportion of households facing catastrophic health

expenditures, and FFCI were calculated. The proportion of costs spent on medical services to household ability to pay was used to determine the proportion of households faced with catastrophic medical expenditure.

The capacity to pay is the effective income of the household minus its subsistence expenditure. Total expenditure by the household was used as an indicator of effective income because it reflects the purchasing power of a household most accurately. The subsistence expenditure was calculated using the food-based poverty line, which is the portion of household total expenditure spent on food.

The capacity to pay was calculated by subtracting subsistence expenditure from total expenditure. This was used to calculate the proportion of household medical expenditure to its capacity to pay. If the result was more than 40%, that household was considered to be facing catastrophic medical expenditure (20).

The following formula was used to calculate FFCI. The results range from 0 (perfect inequality) to 1 (perfect equality) (1).

$$FFCI = 1 - 4 \frac{\sum_{h=1}^H |HFC_h - \overline{HFC}|^3}{0.125H} \quad (2)$$

HFC_h : contribution to financial supply of department of health for the h^{th} household

\overline{HFC} : mean HFCs of the household

H : number of households

Study variables and framework

The proportion of households facing catastrophic health expenditure is a dependent variable. The independent variables were household economic status, basic and supplementary insurance status of the head of the household, use of dental services and inpatient medical services,

existence of individual(s) in the household that require chronic medical care, frequency of use of outpatient services, OOP payment for physician visits, location of residence, number of the household members, educational status of head of household, number of members under age 5 and over age 65, gender of household head, total household expenses, consumption rates, and costs of outpatient medical care. These were entered into a logistic regression model and analyzed using the backward method. The resultant model is shown in Table 1.

A one year recall period was determined for household expenses and use of inpatient services. Researchers confined health costs to direct costs paid by members of a household at the point where health services were received because recall of indirect costs, such as the cost of transportation to the place of service, was accompanied by bias. Household expenditure was considered to be an indicator of household purchasing power, as stated in previous studies (21,22). The data was analyzed using SPSS (SPSS Inc., Chicago, IL, USA) software.

Results

Of the 800 households referred by the health centers, 39 households were excluded because the data provided was incomplete or they declined to complete the questionnaire. The response rate of households was 95.1%. Most household heads had some type of health insurance, but 14% of household heads were not covered by health insurance (Table 2).

It was determined that 78.2% of households had used outpatient services during the previous month, 25.5% had used inpatient services within the past year, and 23.3% had used dental services in the previous month (Table 2). Moreover, 14.2% of households experienced catastrophic healthcare expenditures and 14.3% of households had spent

Table 1. Relationship between determinants and catastrophic healthcare expenditure

Variables	Exp (B)	Confidence interval		Define of Variables
		Lowest	Highest	
Household's economic status				Economic status based on household expenditures
Quintile 1	14.6	5.1	38.5	
Quintile 2	12.2	4.4	33.4	
Quintile 3	6.2	2.3	16.6	
Quintile 4	2.8	1.0	7.8	
Insurance status of household head	0.5	0.2	1.0	Whether household has health insurance (1) or not (0)
Use of dental care	6.9	4.1	11.6	Whether household used dental services (0) or not (1)
Use of inpatient services	1.7	1.0	2.9	Whether household used inpatient services in the previous year (0) or not (1)
Payment for physician visits	2.4	1.3	4.4	Whether the household has paid to visit physicians (0) or not (1)
Frequency of use of outpatient services	1.1	1.0	1.2	Number of times household used outpatient services
Supplementary insurance status of household head	1.7	1.0	3.0	Whether household head has supplementary health insurance (1) or not (0)
Member of household requires chronic healthcare	2.1	1.1	4.2	Member of household requires chronic healthcare (0) or not (1)
Location of residence	0.5	0.2	0.9	Whether household lives in urban (0) or rural area (1)
Consonant	0.01	0.006	0.015	

-2LL= 489.348a; Cox & Snell R square= 0.159; Nagelkerke R square= 0.289

Table 2. Frequency of study households regarding study variables.

Variables	Number	%	% Facing catastrophic expenditures
Household economic status			
Quintile 1 (poorest)	177	23.2	20.3
Quintile 2	127	16.7	19.7
Quintile 3	169	22.3	13.6
Quintile 4	146	19.2	11.6
Quintile 5 (richest)	142	18.6	4.9
Insured status of household head			
Yes	631	82.9	13.8
No	130	17.1	16.2
Existence of persons over age 65			
Existence of persons over age 65	97	12.7	19.6
Existence of persons under age 5			
Existence of persons under age 5	165	21.7	12.7
Member of household requires chronic healthcare			
Member of household requires chronic healthcare	83	10.9	21.7
Location of residence			
Rural	97	12.7	26.8
Urban	664	87.3	12.3
Payment for physician visits			
Payment for physician visits	511	67.1	17.6
Use of dental care			
Use of dental care	178	23.3	30.3
Use of hospital inpatient care			
Use of hospital inpatient care	194	25.5	19.1
Number of outpatient visits			
Number of outpatient visits	595	78.2	
Percentage of household capacity to pay devoted to healthcare service			
≥5	577	75.8	
≥10	457	60.1	
≥20	284	37.2	
≥30	172	22.6	
≥40 (Catastrophic expenditures)	108	14.2	

no money for healthcare in the previous month. When this data was analyzed using the FFCI formula, the index obtained was 0.6 for the study population.

Factors affecting catastrophic expenditure

Table 1 shows the results of logistic regression. The significant factors were determined to be household economic status, basic and supplementary insurance status of household head, use dental services, use of inpatient services, existence in household of person(s) in chronic need of medical care, frequency of use of outpatient services, OOP payment for physician visits, and location of residence.

Household economic status: The odds of facing catastrophic expenditure decreased as the household economic level increased. For example, the number of households in the first quintile likely to face catastrophic expenditure was almost 14 fold the number in the 5th quintile.

Supplementary insurance status of household head: Households with heads that did not have any type of supplementary health insurance were 75.0% more likely to face catastrophic medical expenditure than those with heads that had some type of supplementary health insurance coverage.

Use of dental services: The odds of experiencing catastrophic medical expenditure for households that had recently used dental services was 7 fold that of households that had not

used dental services.

Use of inpatient services: The odds of being faced with the catastrophic expenditures in the households which had used inpatient services in the previous year were 75.0% greater than those that had not used such services.

Frequency of use of outpatient services: The likelihood of facing catastrophic medical expenditure increased 11.0% each time a household made use outpatient services.

Payment for physician visits: The likelihood of facing catastrophic medical expenditure in households that were required to pay OOP for physician visits was almost 2.5 fold that of households that did not have to pay for visits.

Existence in household of individual(s) in chronic need of medical care: The odds of a household facing catastrophic expenditure if it contained individual(s) in chronic need of medical care were twice that of households that did not contain individual(s) in chronic need of medical care.

Location of residence: The likelihood of facing catastrophic medical expenditure for households located in rural areas was 49.0% greater than for those living in urban areas.

Whether or not the household head had medical insurance was not a significant factor for the likelihood of that household experiencing catastrophic health expenditure, but it was shown that experiencing catastrophic health expenditure was less likely in households whose heads were covered by health

insurance.

The results of the Hosmer–Lemeshow test ($P=0.3$) confirmed the accuracy of the model.

Discussion

The FFCI and the proportion of the households faced with catastrophic health expenditure are two indicators that can help policy-makers identify the shortcomings of risk contribution and other financial protection mechanisms available in financing systems (1). The results of this study indicate that the present health system has been unsuccessful in protecting households from the economic burden of catastrophic health expenditure in the community studied.

The results show that FFCI equaled 60.0% in Shiraz. Past studies of different regions of Iran have the reported FFCI values ranging from 83.7% in a national study in 2005 (16) to 56.0% in a study conducted in Kermanshah province in 2009 (17). In the present study, 14.2% of households faced catastrophic health expenditures. This indicator has been reported to be from 2.0% to 22.0% in national and regional studies (16,17,23,24).

This low FFCI value and the large number of households facing catastrophic expenditures are signs of deficiencies in the financial protection of Iran's health system that are worth considering. Two factors can predict disproportionate financial contributions by a household to the health system: health system features and household characteristics. The former includes high OOP expenditure at the point of healthcare service, its regressivity, and lack of prepayment plans. The latter includes factors such as the low ability of a household to meet the expenditures, use of health services, and location of residence.

A global study of 59 countries showed that the percentage of households facing catastrophic health expenditure differed by country and ranged from almost zero in Slovakia, Great Britain and the Czech Republic to more than 10.0% in Brazil and Vietnam (20). Kanul *et al.* reported this index to range from 0.1 to 0.2 in 12 countries in Latin America and the Caribbean (25). Studies conducted in Turkey and Thailand reported that the percentages of households facing catastrophic expenditures was 0.6% and 8% to 14.0%, respectively (9,26).

The varied performance of these countries appears to be related to the structure of the particular health system. Countries with tax-based health insurance provide greater public protection, while countries with private health insurance or mixed systems performed less effectively in this regard. Iran has a mixed health insurance system and not all households are covered. The present study showed that having health insurance and its service coverage are factors that can protect household against the catastrophic health expenditure. Households that were not covered by insurance or who used services not included in the insured's health package should allocate a higher percentage of their capacity to pay to health costs. The findings of the present study are in agreement with the results of studies conducted in other countries (12,24,25,27).

Universal health insurance coverage can help reach the goal of financial protection against catastrophic health expenditure.

It is important to determine how many people are covered for which type of service and what percentage of costs is actually covered. In Iran, in spite of the high percentage of insurance coverage of households, prepayments do not actually protect households at the time of service from inappropriate benefit packages. Revising the health benefit package is necessary in Iran. To do so, policy-makers should know which services are vital for the public and identify those that put more financial burden on households to arrive at policies for appropriate benefit packages. As Kwon (28) has stated, the breadth and depth of benefit coverage is key to financial risk protection.

The results of the present study have shown that having supplementary insurance coverage decreases the risk of facing catastrophic health expenditure. As shown, the risk of facing catastrophic health expenditure in households whose heads do not have supplementary insurance was 75.0% more than those whose heads had supplementary insurance coverage. The improved coverage by supplementary health insurance compared to basic health insurance highlights the weakness of basic insurance plans in Iran and better protection of supplementary insurance for members.

In Iran, supplementary insurance covers costs and services that are not covered by basic insurance. If households must pay at the point of service or use services not covered by basic insurance, supplementary insurance will pay a percentage of those costs. Coverage by supplementary insurance can be a mechanism for the financial protection of households against the costs of healthcare services. In Iran, supplementary health insurance is optional and is provided by the private sector; consequently, most people are not willing or do not have the ability to purchase such policies.

The results of the present study show that the major reason for a household to experience catastrophic health expenditure was their economic status. This agrees with the findings of studies conducted in Iran and elsewhere (7,15,19). One study conducted in 13 Asian countries showed that households with better economic levels, particularly in countries with low and middle-sized economies, spent a higher proportion of their ability to pay on health services. This may also be affected by the fact that the poor avoid the use of and payment for health services (29). A study conducted by Mishra and Mukhopadhyay (30) showed a major relationship between economic status and healthcare service utilization.

This issue cannot be met solely by the health system; improving the economic status requires multi-sectorial intervention. The healthcare system can only affect the amount paid by households for health services by providing health insurance or controlling costs. Sometimes even low health expenditure is catastrophic for a household with a low ability to meet the costs. This cannot be resolved unless the social welfare system of the country improves and the government increases a household's ability to pay. Another improvement can be implementation of urban family physicians and a referral system that effectively decreases costs of services.

The existence in a household of an individual(s) requiring chronic medical care was another factor affecting the likelihood of facing catastrophic health expenditure. In

general, individuals requiring chronic care are more ill than ordinary individuals. The health expenses of households with such members are higher and their capacity to pay may decrease. Studies that have taken this factor into account agree with this finding (12,25,26,31).

The present findings demonstrate that households that used dental or inpatient services were more likely to face catastrophic expenditure. Somkotra and Lagrada (12) concluded that admission to a public or private hospital in the last 12 months of a member of a household was indicative of experiencing catastrophic health expenditure. This relationship was more significant for individuals admitted to a private hospital. Su *et al.* (11) confirmed the relationship between service consumption and facing catastrophic expenditures.

Use of dental services, which are expensive and not covered by health insurance packages in Iran, were indicative of a household experiencing catastrophic health expenditure (24). This indicates that policies to decrease catastrophic expenditure in Iran should consider dental care coverage and determine which aspects of this service should be covered by basic and supplementary insurance.

Increases in the use of outpatient services and physician visits increased the likelihood of experiencing catastrophic expenditure. The results showed an 11.0% increase in experiencing catastrophic health expenditures for each use of outpatient services (Table 1).

The results of this study show that the location of the residence in a rural area increased the likelihood of facing catastrophic health expenditure. Studies inside and outside the country have confirmed this finding (17,23,25,26). This difference might be a result of the lower capacity of rural residents to meet costs, fewer physical opportunities and less time to pursue health services and delays seeking care until a condition has developed to the point where more expensive care is required.

Study limitations

In the present study, as in similar studies, there was a probability of over- or under-reporting of the costs and of recall bias. An attempt was made to minimize these problems by shortening the recall period and also reconfirming the cost data by randomly recontacting households who had completed the questionnaires.

Conclusion

It is necessary to understand the extent and severity of a problem to provide useful and constructive solutions to it. The solutions offered should be evaluated according to their position and the state of the system. Ultimately, one or some of these solutions should be used to solve the problem (29).

The study findings suggest that the reasons for a household encountering catastrophic health expenditures fall into the categories of high OOP payments, low ability to pay, and lack of protective mechanisms. It is evident that policies in this regard should focus on decreasing OOP payments, promoting the ability to meet payments using public welfare mechanisms, and creating protective mechanisms such

as insurance packages and exemptions for the poor from coverage of exceptional medical costs.

There were significant differences between the results of regional and national studies in Iran which highlight the need for databases that delineate the household quantitative and qualitative variables. It is clear that effective policies that promote equity in health and the monitoring of these policies have a direct relationship with such information. Policy-makers should immediately take steps to create such databases (32).

Long-term studies examining the behavior of households suffering from serious medical conditions can provide policy-makers with more accurate information to make appropriate decisions.

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Ethical issues

The study was approved by the ethic committee of Shiraz University of Medical Sciences.

Competing interests

The authors declare that they have no competing interests.

Authors' contributions

ZK and RH designed the research; ZK, RH, RR, AK, and MKH contributed to literature searches, analysis of the results and their interpretation; ZK, RH, RR, AK, and MKH drafted the initial manuscript. ZK, RH, and MKH were the main contributors; other co-authors contributed to specific minor parts by responding to reviewer remarks and recommendations. All authors read and approved the final manuscript.

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